Status: Tritium Plasma Experiment at the INL Safety and Tritium Applied Research (STAR) Facility

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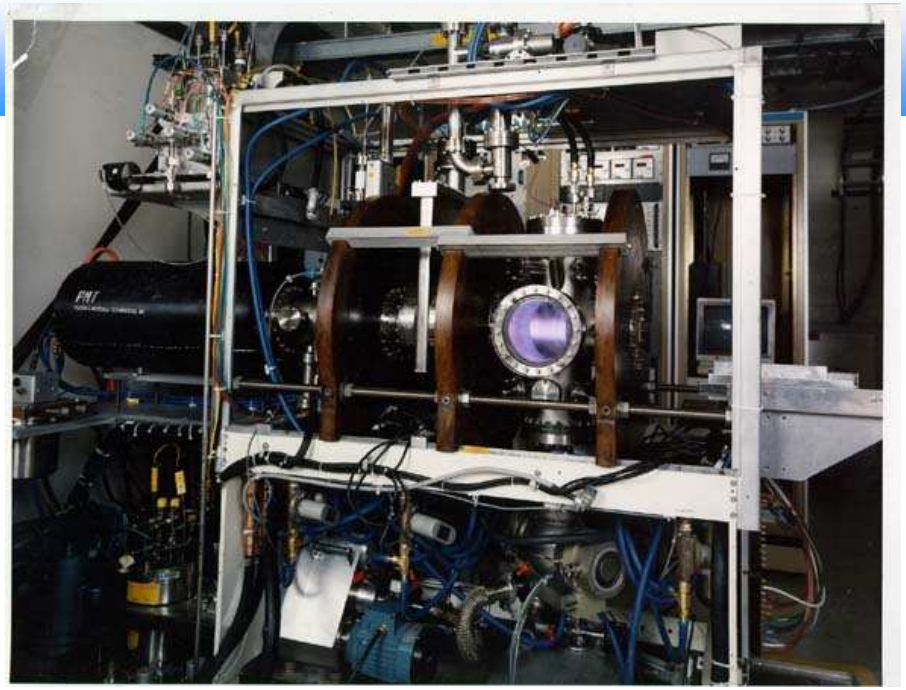
Idaho National Laboratory

Outline

- Re-assembly/installation activities
- System integration/testing activities
- Plans for initial plasma operation and experiments

Tritium Plasma Experiment (TPE)

Steady-state plasma generator
Tritium and Be compatible
Plasma density: 10^{19} /m^3
Plasma ionization fraction: 1-10%
Ion flux: 10^{19}-3x10^{22} /m^2
Ion energy: 15-200 eV
Target temperature: 100-800°C



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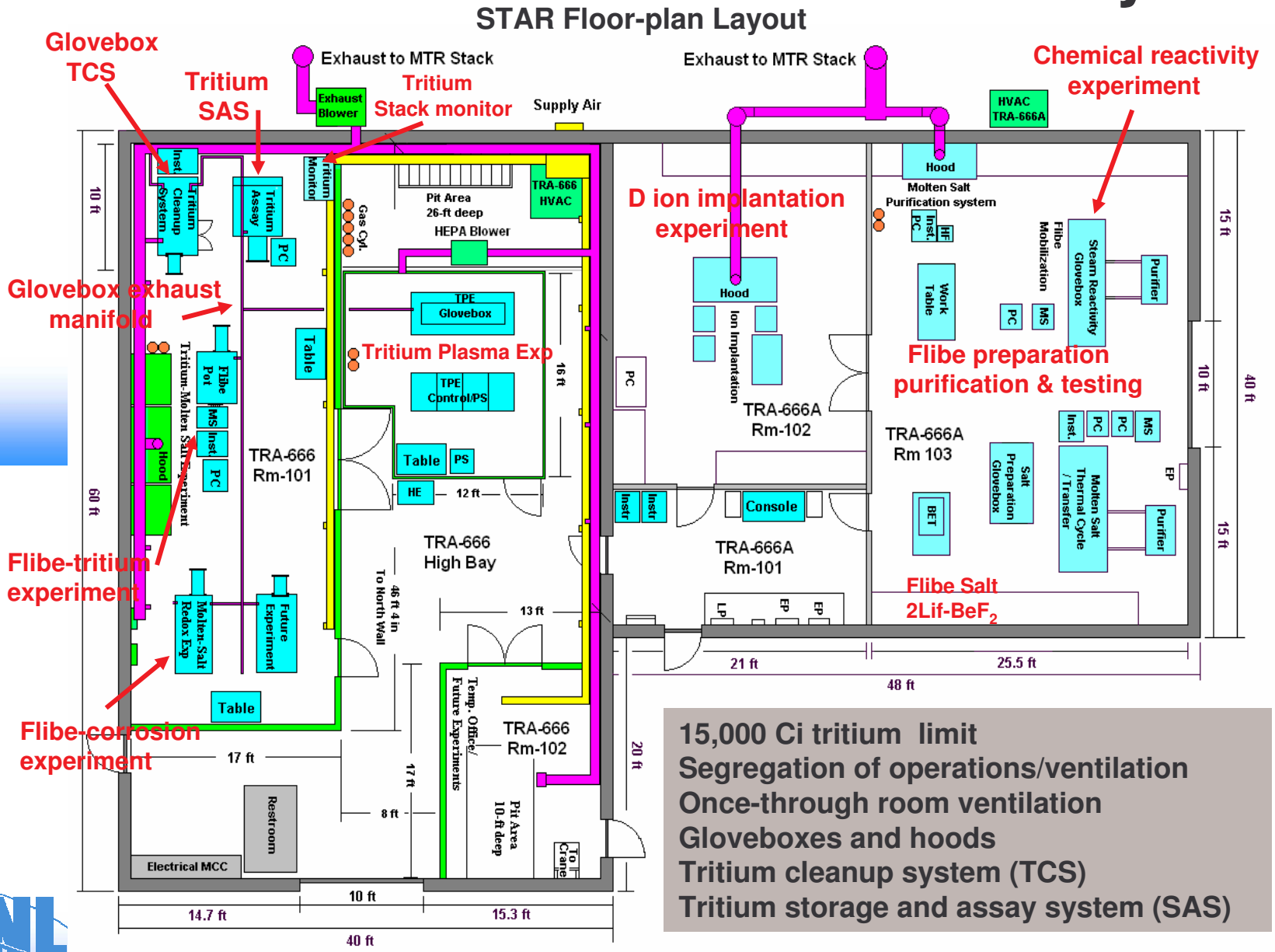
TPE is located in the STAR Facility



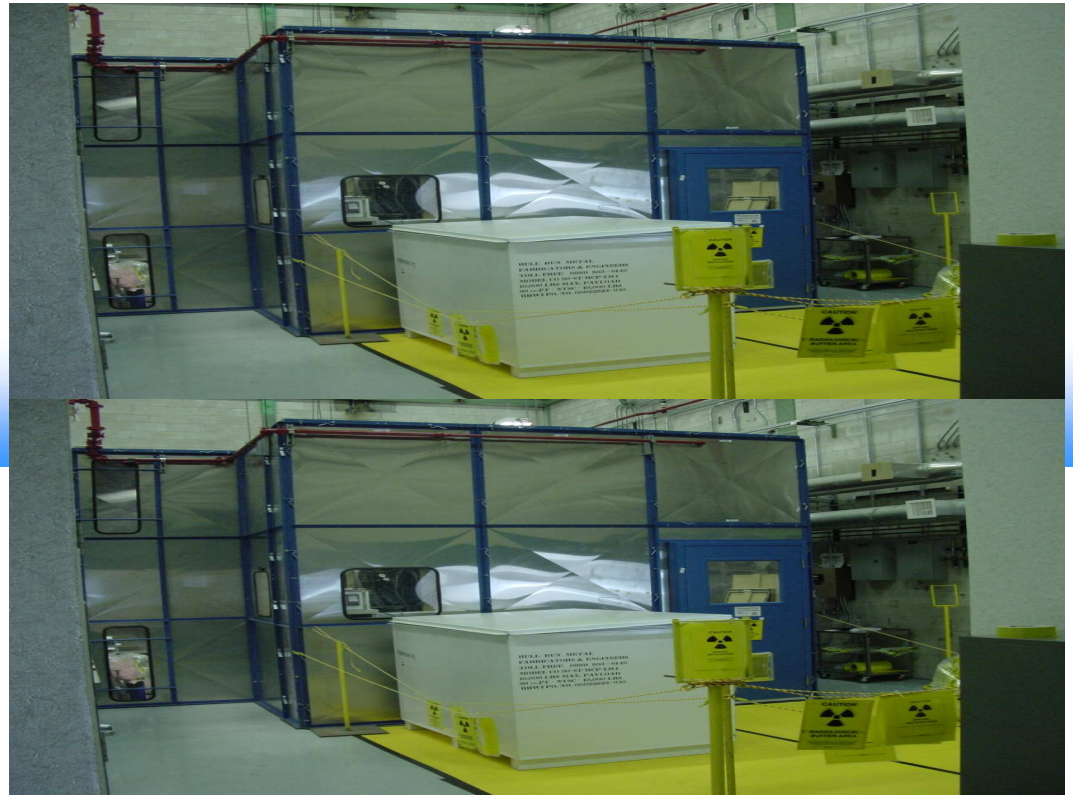
- 15,000 Ci tritium limit
- Segregation of operations/ventilation
- Once-through room ventilation
- Gloveboxes and hoods
- Tritium cleanup system (TCS)
- Tritium storage and assay system (SAS)

TPE Re-assembly, Setup and Operation

- Re-assemble TPE in HEPA-filtered ventilated room
- Install utility services for TPE system in PermaCon room
  - Electrical, water, gas, effluent control, ^{3}H monitoring
- Interface TPE system to STAR utility services
  - Electrical, coolant systems, glovebox ventilation, TCS
- Check TPE components, update and test
  - Vacuum pumps, pneumatic valves/lines, control instrumentation, water lines, plasma source, power supplies, heaters, gas flow cont.
- TPE system integration and testing
  - Establish system vacuum; operate control instrumentation, power supplies, coolant and gas systems, and plasma source
  - Initiate plasma operation with hydrogen
- Initiate TPE experiments with hydrogen/deuterium plasmas
- Prepare for operation with tritium
  - Glovebox testing, purge gas control, TCS interface, U-bed installation, ^{3}H source
- Prepare ISMS documentation and procedures

Green: completed, blue: partial comp., red: to do

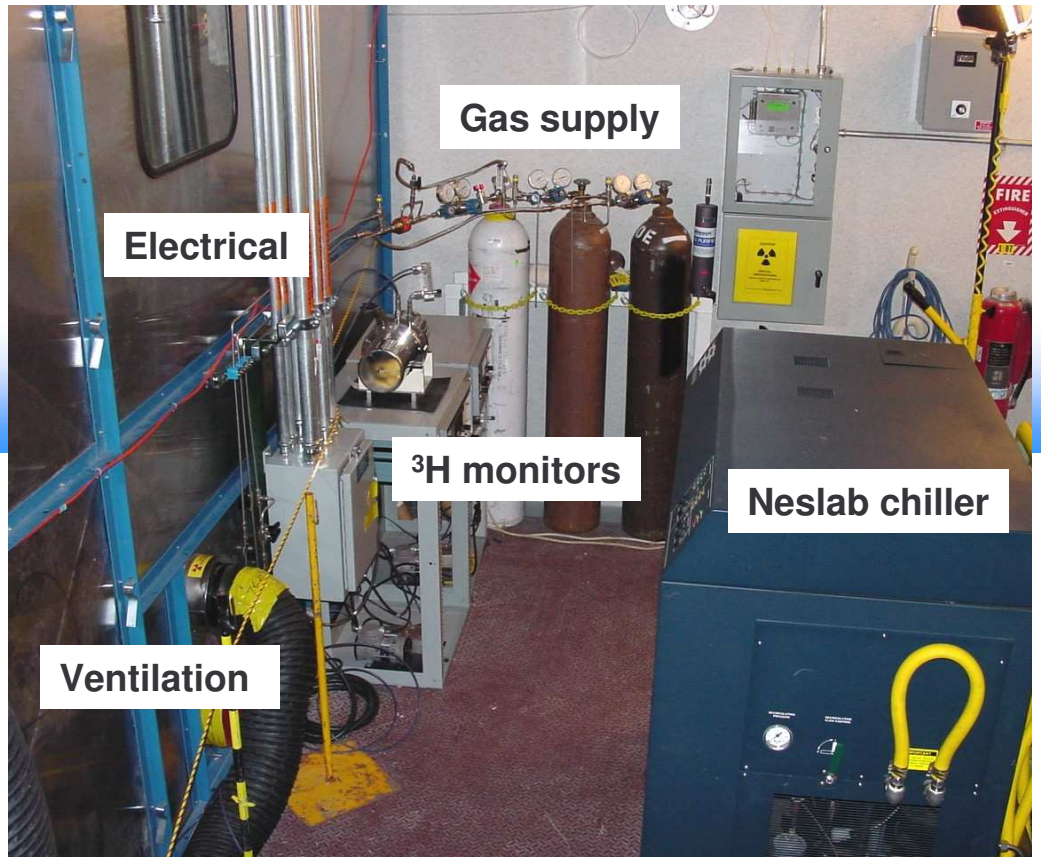
TPE is in a HEPA-filtered ventilated room

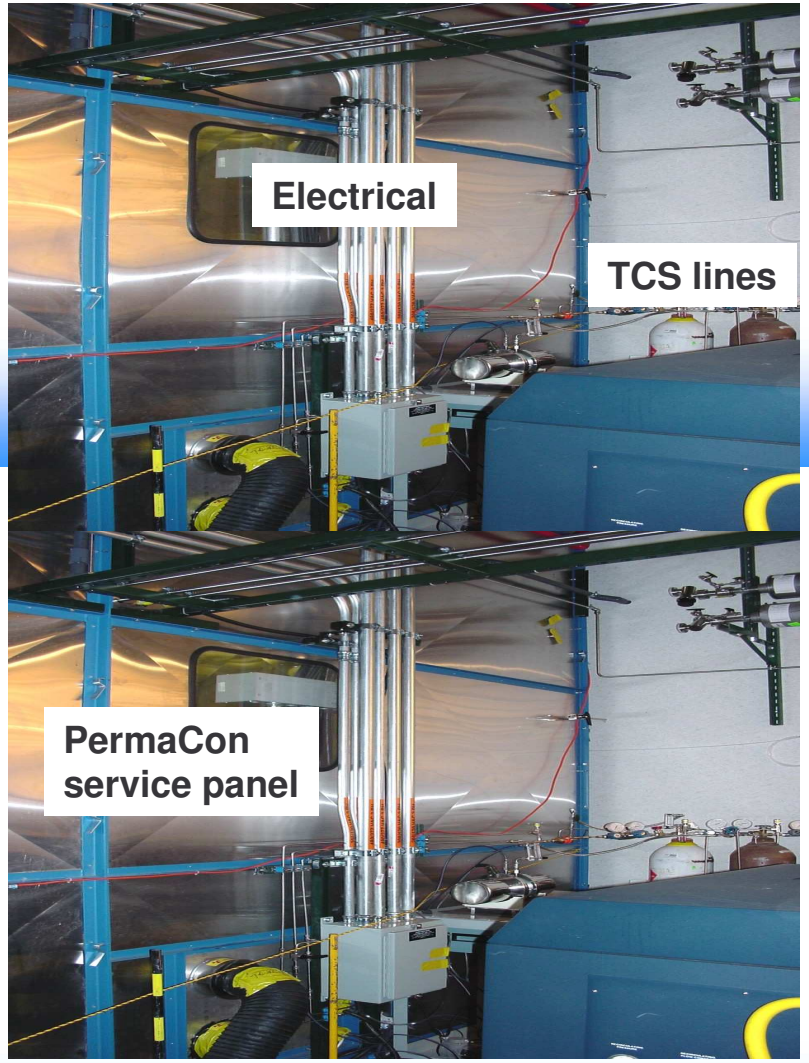


PermaCon enclosure housing
TPE and ancillary equipment

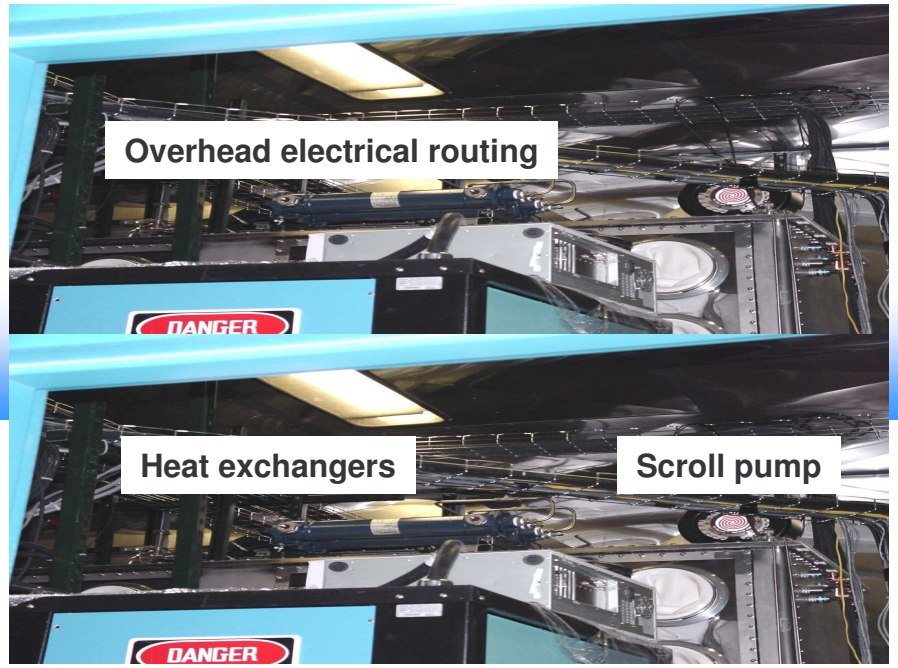
Auxilliary blower and HEPA filter
for room ventilation.

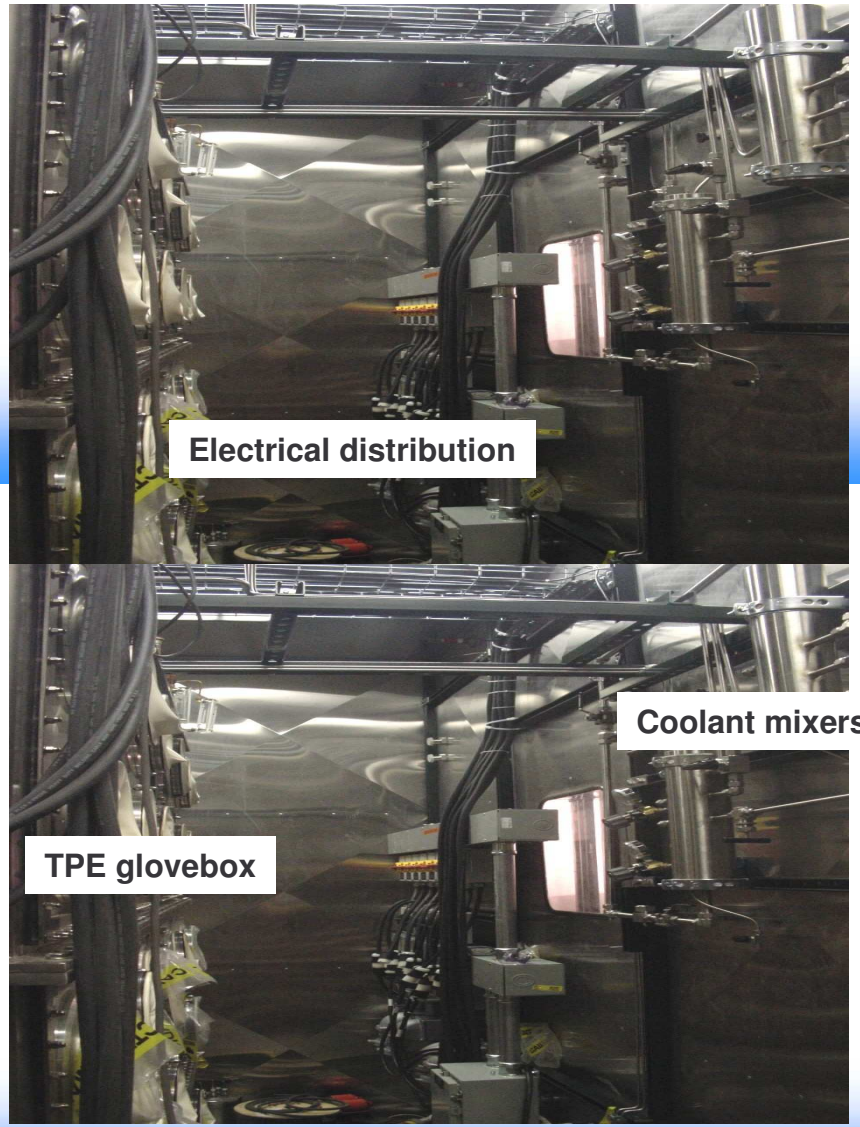
Utility services for TPE





Distribution of utility services inside the PermaCon





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Plans and schedule for TPE set up and operation

- Complete TPE interface to utility services (May-05)
  - Component coolant system
- Complete testing of TPE components (May/June-05)
  - Pneumatic & water lines, coolant systems, control instrumentation, power supplies,plasma source, heaters, gas flow controllers
- Complete system integration & testing (June/July-05)
  - Establish system vacuum, integrated operation of all systems, initiate plasma operation with H
- Initiate TPE experiments: H or D plasmas (July-05)
- Complete preparation for ^{3}H operation (Sept.-05)
  - Glovebox testing, TCS interface, U-bed install
- Complete ISMS documentation and procedures for initial tests (June/July-05)